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Quantitative Analysis of the Publishing Landscape in High-Energy Physics

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Abstract

World-wide collaboration in high-energy physics (HEP) is a tradition which dates back several decades, with scientific publications mostly coauthored by scientists from different countries. This coauthorship phenomenon makes it difficult to identify precisely the "share" of each country in HEP scientific production. One year's worth of HEP scientific articles published in peer-reviewed journals is analysed and their authors are uniquely assigned to countries. This method allows the first correct estimation on a *pro rata* basis of the share of HEP scientific publishing among several countries and institutions. The results provide an interesting insight into the geographical collaborative patterns of the HEP community. The HEP publishing landscape is further analysed to provide information on the journals favoured by the HEP community and on the geographical variation of their author bases. These results provide quantitative input to the ongoing debate on the possible transition of HEP publishing to an Open Access model.

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1 Introduction

High-energy physics (HEP) is commonly regarded as one of the most international and collaborative scientific disciplines. Over the last six decades, large experiments at accelerators of ever-increasing energy brought together first dozens, then hundreds and now thousands of scientists from an increasingly wider spectrum of countries. Furthermore, theoretical HEP predates by a long time present-day cross-border communication as a truly global enterprise. This endeavour was fostered by a long-standing tradition of scientific exchange, regular gatherings and long-term visits to several major centres of attraction by scientists.

As a consequence of this well-established and thriving cross-border tradition, coauthorship of HEP articles by scientists affiliated to institutes in different countries is the norm rather than the exception. At the same time this coauthorship phenomenon complicates bibliometric studies aimed at evaluating the relative contributions of different countries to the production of HEP articles.

This article presents an analysis of the distribution of HEP authorship over several countries and institutes, taking into account the coauthorship phenomenon on a *pro rata* basis. This analysis is based on one year's worth of HEP articles, selected as presented in Section 2. Section 3 explains the data-analysis procedure and discusses some bibliometric results. Results on the geographical distribution of HEP authorship are presented in Section 4 and then interpreted in Section 5 in terms of global collaborative patterns. The publishing landscape is investigated in Section 6, which identifies the journals most used by HEP authors. Section 7 presents additional results on the breakdown of the author base of the leading HEP journals among different countries; the distribution over different journals of the HEP scientific production of several countries and institutes is also discussed.

These results are particularly relevant as they constitute a quantitative basis for the ongoing debate on the possible transition of HEP publishing to an Open Access model [1]. No assessment of the economical implications of such a transition is possible without clear and uncontroversial data on the contributions of different countries to HEP scientific publishing, which is presented here for the first time.

2 Data Sample

The *preprint culture* in HEP pioneered the free distribution of scientific results. For decades, theoretical physicists and scientific collaborations, eager to disseminate their findings in a way faster than the distribution of scholarly publications, printed and mailed hundreds, even thousands, of copies of their manuscripts before submitting them to peer-reviewed journals. This preprint culture tended, however, to favour the large laboratories and universities that could afford mailing large numbers of preprints while receiving comprehensive regular mailings [2]. The spread of the Internet and the inception of the `arXiv` repository [3] ushered a new era for the preprint culture, offering all scientists a level playing field. In its current implementation, `arXiv` allows researchers to submit their preprints and browse or receive regular feeds on recent submissions in their area of interest [4]. The `arXiv` repository and its mirrors collect the *corpus* of HEP articles, classified into four categories:

- `hep-ex`, for high energy experimental physics;
- `hep-lat` for studies of lattice field theory;

- `hep-ph` for particle phenomenology;
- `hep-th` for string, conformal and field theory.

The attribution of articles to a particular category is performed by the authors themselves at submission time. The system supports cross referencing while multiple submission is frowned upon so that no double counting of the same article from two categories is expected in the following analysis.

This analysis is based on all preprints submitted to `arXiv` in the year 2005 and classified in one of the four HEP categories. Owing to its widespread preprint culture, this sample represents a faithful snapshot of HEP peer-reviewed scientific literature.

As in many other disciplines, HEP results are often presented in preliminary form at international conferences or workshops before being officially released in the form of a publication in a peer-reviewed journal. Results are then often summarised at other conferences in the following years. Preprints usually appear describing these conference contributions and therefore `arXiv` stores multiple, albeit different, entries corresponding to different phases of the life-cycle of a scientific result. To avoid this form of multiple counting of the same piece of work, the following analysis is restricted to preprints subsequently published in peer-reviewed journals. This requirement also removes lecture notes, theses and other unpublished material submitted to `arXiv` but not relevant for this analysis.

The data on which this analysis is based are extracted from the `SPIRES` database [5] hosted at SLAC, the Stanford Linear Accelerator Center in California, and jointly compiled together with DESY, the Deutsches Elektronen-Synchrotron in Hamburg, and FNAL, the Fermi National Accelerator Laboratory in Illinois. This database is chosen as it has a complete coverage of the HEP articles in `arXiv` and in addition includes publication information. As an example, the sample of preprints submitted to the `hep-ex` category in `arXiv` during 2005, and subsequently published, is obtained with the following query:

```
FIND EPRINT HEP-EX/05# AND PS P AND NOT TYPE C
 AND NOT TYPE L AND NOT TYPE B AND NOT TYPE T
```

Conference articles, lecture notes, theses and books are explicitly removed from the search. The samples for the other three `arXiv` categories are obtained *mutatis mutandis*.

3 Data Analysis

Table 1 presents the numbers of hits obtained by the `SPIRES` query in the four categories and their sum for the year 2005 as well as the entire historical record. A total of 5016 articles are selected for the year 2005. The total numbers of submissions for each `arXiv` category obtained with queries such as:

```
FIND EPRINT HEP-EX/05#
```

are also presented in Table 1 together with their sum. The difference with the sample considered in this article is composed of conference articles and unpublished material. The ratios of the numbers of published articles to the numbers of `arXiv` submissions is also presented in Table 1.

The historical evolution of the numbers in Table 1 is interesting: early years show a gradual increase in the number of submissions, consistent with the gradual adoption of the system, while numbers for

	hep-ex			hep-lat			hep-ph			hep-th			Total		
Year	N_S	N_P	ε	N_S	N_P	ε	N_S	N_P	ε	N_S	N_P	ε	N_S	N_P	ε
2005	854	338	40%	663	246	37%	3918	2207	56%	3238	2225	69%	8673	5016	58%
2004	885	349	39%	586	261	45%	4138	2534	61%	3357	2361	70%	8966	5505	61%
2003	771	287	37%	575	227	39%	3964	2381	60%	3275	2428	74%	8585	5323	62%
2002	885	293	33%	583	218	37%	4245	2383	56%	3333	2482	74%	9046	5376	59%
2001	819	328	40%	574	218	38%	4228	2499	59%	3181	2305	72%	8802	5350	61%
2000	735	324	44%	508	235	46%	4124	2390	58%	3144	2259	72%	8511	5208	61%
1999	666	317	48%	588	244	41%	4076	2602	64%	2825	2180	77%	8155	5343	66%
1998	406	231	57%	623	282	45%	3807	2442	64%	2774	2061	74%	7610	5016	66%
1997	325	192	59%	548	227	41%	3615	2305	64%	2865	1990	69%	7353	4714	64%
1996	166	82	49%	558	248	44%	3327	2149	65%	2626	1924	73%	6677	4403	66%
1995	158	99	63%	437	228	52%	2990	2008	67%	2347	1704	73%	5932	4039	68%
1994	67	35	52%	447	202	45%	2500	1714	69%	2349	1639	70%	5363	3590	67%
1993	–	–	–	374	209	56%	1762	1275	72%	2084	1460	70%	4220	2944	70%
1992	–	–	–	321	180	56%	755	559	74%	1378	1080	78%	2454	1819	74%
1991	–	–	–	4	3	75%	–	–	–	302	228	75%	306	231	75%

Table 1: Numbers of preprints submitted to the different `arXiv` HEP categories (N_S) and subsequently published in peer-reviewed journals (N_P) together with their total. The ratio $\varepsilon = N_S/N_P$ is also listed. Figures are given for the entire `arXiv` historical sample. Data corresponding to the year 2005 is used in this analysis.

later years are consistent with a plateau structure with year-to-year variations of a few percentage points.

The queries on which this article is based were performed in the second half of October 2006 and one could argue that some preprints submitted in late 2005 could have still been in the editorial process and would not therefore have yet appeared in peer-reviewed journals. If the five-year period $2000 - 2004$ is used to predict the number of articles extracted by the query for the year 2005, this is just 6% above the number actually observed, leading to the conclusion that no large systematic bias affects the size of the sample under consideration. There are no reasons to believe that any sizable systematic effect from a small fraction of "undiscovered" articles would affect the relative contributions of different countries presented in the following.

Figure 1 presents the distribution among the four different `arXiv` categories of the 5016 articles on which this analysis is based. Experimental results account for just 6.7% of the total.

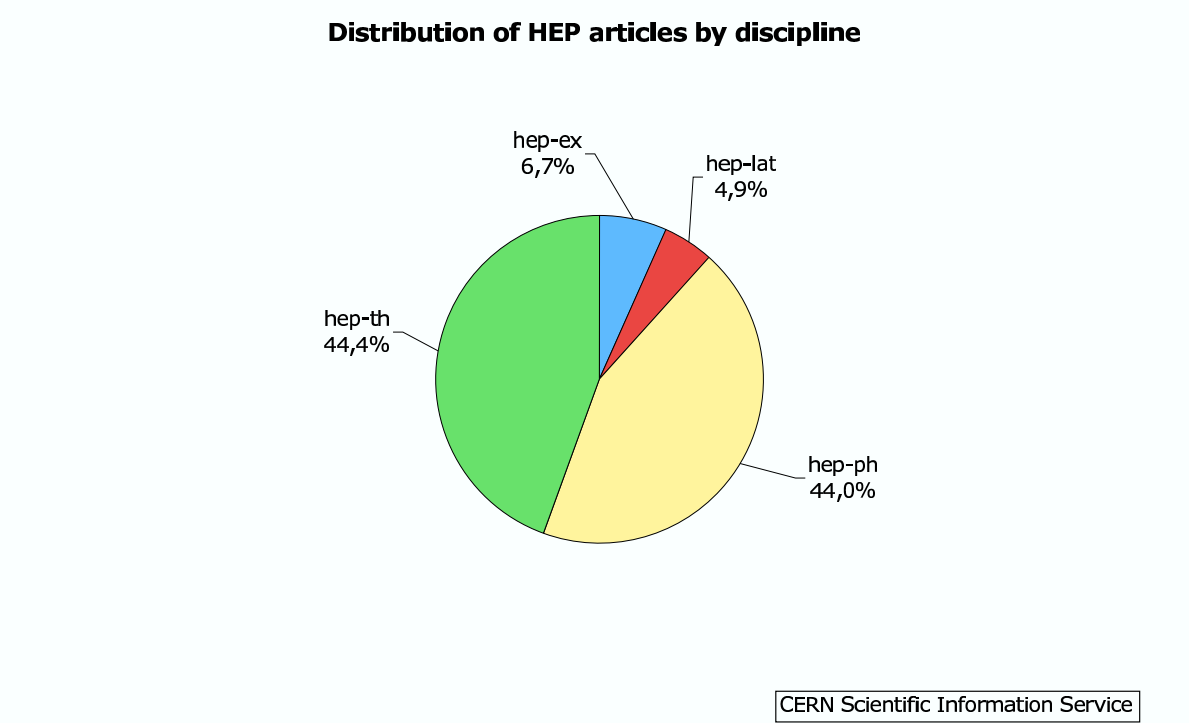

Figure 1: Distribution by `arXiv` category of the sample used in this analysis, corresponding to 5016 preprints submitted in the year 2005 and subsequently published in peer-reviewed journals.

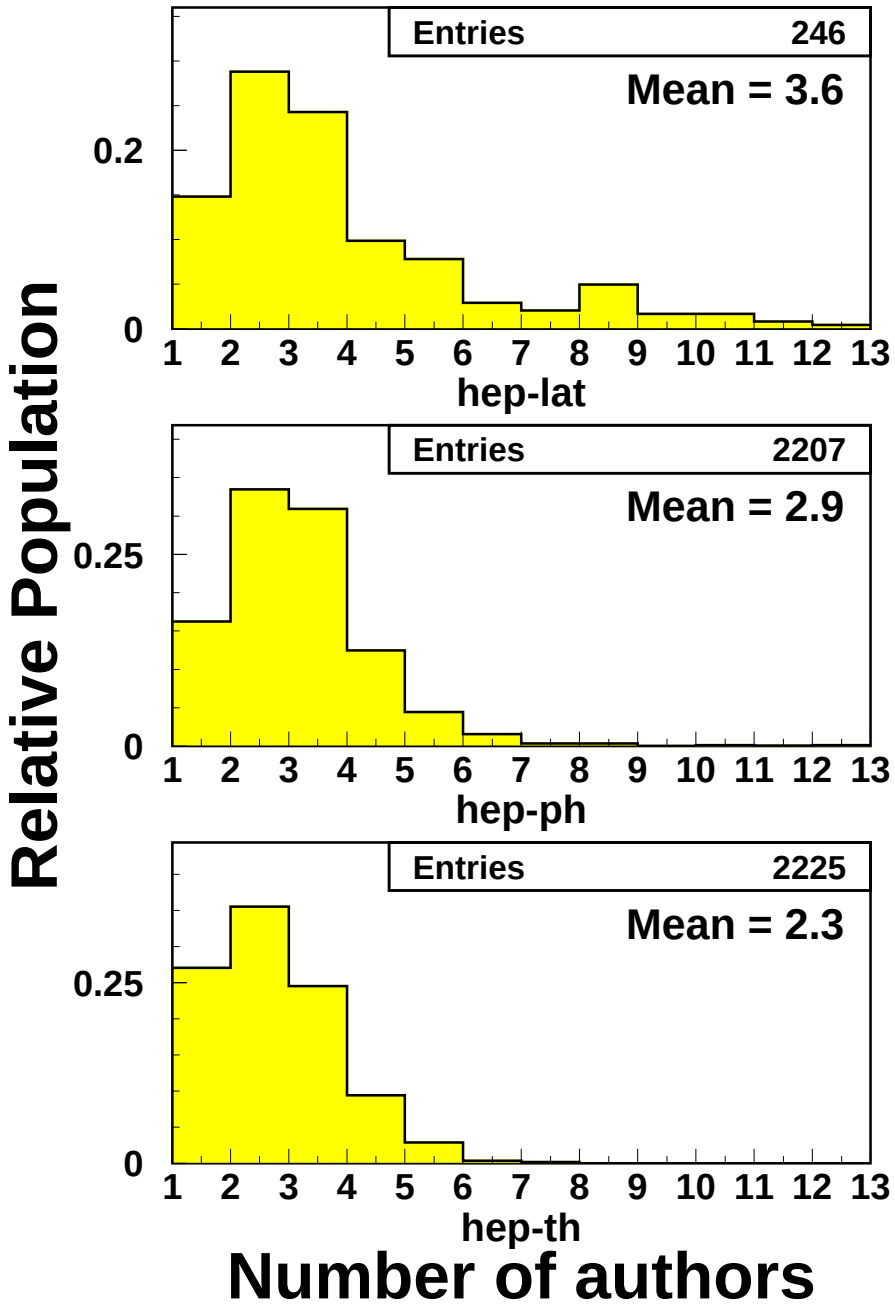

Figure 2: Distributions of the number of authors of `hep-lat`, `hep-ph` and `hep-th` articles used in this analysis. The distributions are normalised to unit area and their mean is indicated.

A first bibliometric result extracted from this study is the distribution of the number of authors per article. Figure 2 presents the distribution of the number of authors of each article in the three non-experimental classes `hep-lat`, `hep-ph` and `hep-th`. The average number of authors for the three classes are 3.6, 2.9 and 2.3, respectively. The average number of authors for the sum of the three classes is 2.6. The average number of authors for the `hep-ex` class is about 290. The distribution of the number of authors is biased by the fact that a dozen large experimental collaborations appear several times in the data sample. The breakdown of the considered `arXiv:hep-ex` sample into different experiments is shown in Figure 3. Implications of the large number of authors in experimental collaborations are discussed in Reference [6].

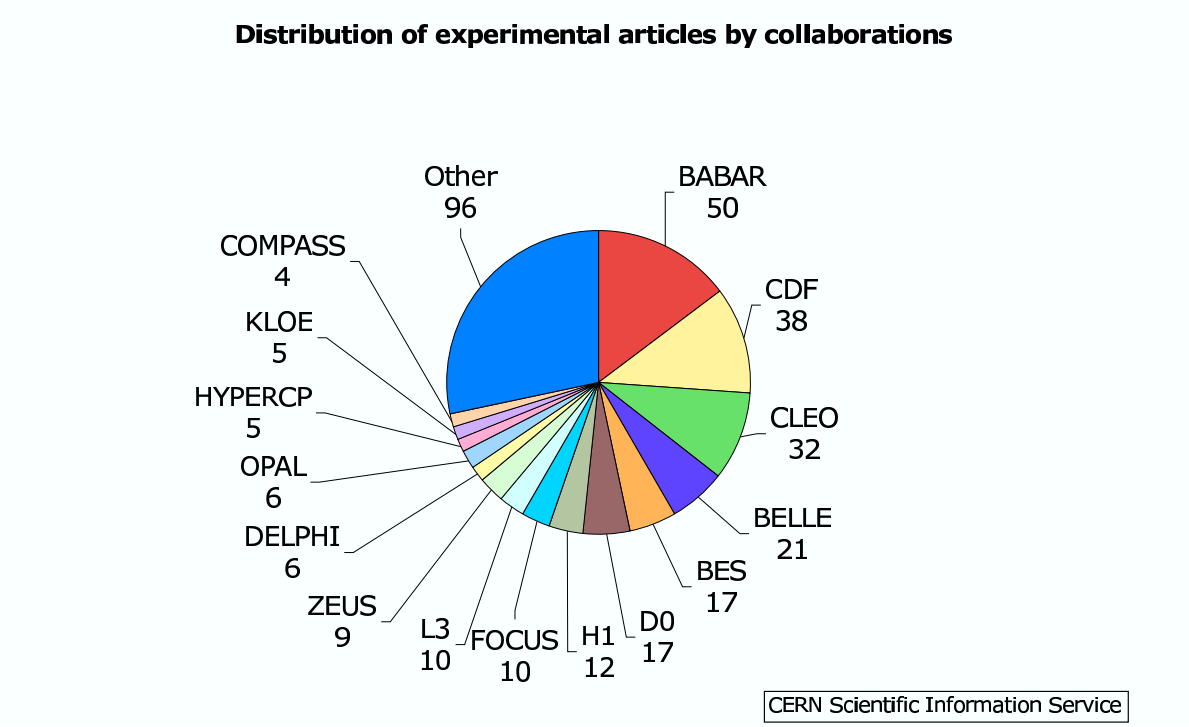

Figure 3: Number of articles from the large experimental collaborations submitted to `arXiv:hep-ex` in 2005 and subsequently published in peer-reviewed journals. The "Other" category comprises collaborations which published less than 4 articles as well as articles with less than 40 authors. The total number of articles is 338.

Unfortunately, as of today, no database allows an automatic extraction of bibliographic information concerning author affiliations for HEP articles at the level needed for this analysis. Therefore each article satisfying the query had to be inspected to perform a manual classification of the authors according to their affiliation. The output format of SPIRES partly alleviates this problem as author affiliations are often readable off the standard web-based output of the queries without having to access the article metadata on a publisher's web site or the full-text version in arXiv. Author affiliations were classified into 22 classes, listed in the first column of Table 2. European, American and Asian countries are singled out according to their contribution to the global HEP scientific production, down to a lower limit of about 1%. The contribution from CERN, the world's largest HEP laboratory, is shown separately. The remaining countries are divided into two classes: CERN Member States[3] and the remaining countries. As the vast majority of HEP in Italy is funded by INFN, the Istituto Nazionale di Fisica Nucleare, its contribution has been considered *in lieu* of the Italian one. Italian authors without an INFN affiliation are counted in the "Other Member States" category.

As mentioned above, medium- and long-term visits of authors to different institutes and major laboratories is the staple diet of the HEP collaborative soul. As a consequence, authors of HEP articles often have multiple affiliations. Three principles to assign authors with multiple affiliations to a single class are followed in the order they are presented below.

1. If one of the multiple affiliations of an author is a HEP laboratory, the author is assigned to that laboratory in the case of CERN, or to the host nation of the laboratory in the other cases.

2. If only one of the multiple affiliations of an author corresponds to one of the countries explicitly singled out for the analysis, the author is assigned to that country.

3. If more than one of the multiple affiliations of an author corresponds to one of the countries explicitly singled out for the analysis, the author is assigned to a country or institution, according to an indicator which takes into account their *pro-capita* Gross Domestic Product and their expected share of the HEP scientific production.

4 Distribution of the HEP Production by Country

The first result of this analysis is the calculation of the share of HEP publications authored by each of the 22 countries and institutions into which the authors are classified. For each article in one of the four arXiv categories, each of the 22 countries and institutions is attributed a fraction of the article corresponding to the number of authors associated to that country, divided by the total number of authors. The sum of these fractions over all the articles of an arXiv category, divided by the total number of articles in that category, defines the share of a particular country or institution. The results are listed in Table 2 for the four arXiv categories as well as for their average. Figure 4 presents the distribution of the HEP scientific production over different countries. To our knowledge, this is the first result on the distribution of the HEP scientific literature by country where the phenomenon of coauthorship is taken into account.

It is interesting to combine the results presented in Table 2 into the three largest sections of HEP authorship: CERN and its Member States, the United States, and the remaining countries. These

[3]CERN Member States not already listed in the first column of Table 2 are: Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, Greece, Hungary, Norway, Poland and the Slovak Republic.

results are presented in Table 3 for the four `arXiv` classes and their average. Figures 5 and 6 show a summary of the distributions of HEP authorship for the `arXiv` classes and their average, respectively.

	hep-ex	hep-lat	hep-ph	hep-th	Average
CERN	0.9%	1.1%	1.7%	1.1%	1.3%
Germany	6.3%	19.5%	10.3%	6.5%	8.8%
UK	6.4%	6.3%	6.6%	8.5%	7.4%
INFN	11.0%	5.8%	5.6%	5.3%	5.8%
France	4.1%	2.0%	3.3%	3.2%	3.2%
Spain	0.8%	1.2%	3.5%	2.6%	2.8%
Switzerland	1.2%	1.1%	1.2%	0.9%	1.1%
Sweden	0.2%	1.2%	0.8%	1.0%	0.9%
Portugal	0.3%	0.5%	1.4%	0.5%	0.9%
Netherlands	0.6%	0.5%	0.5%	1.4%	0.9%
Other Member States	3.5%	3.3%	6.7%	7.9%	6.8%
Russia	5.1%	3.5%	5.6%	4.0%	4.8%
Israel	0.3%	0.8%	0.9%	1.3%	1.0%
United States	40.2%	30.0%	22.8%	22.3%	24.1%
Canada	1.8%	1.7%	2.0%	3.6%	2.7%
Brazil	0.7%	0.8%	1.9%	3.8%	2.6%
India	0.4%	2.0%	2.7%	3.0%	2.6%
Japan	6.3%	9.2%	6.4%	8.4%	7.4%
China	6.4%	2.3%	6.6%	2.6%	4.6%
Korea	1.1%	0.2%	1.8%	2.0%	1.8%
Taiwan	1.1%	0.5%	1.6%	0.8%	1.2%
Other Countries	1.1%	6.5%	6.0%	9.3%	7.2%

Table 2: Distribution of HEP scientific literature over different countries and institutions for the four HEP `arXiv` classes and their average.

	hep-ex	hep-lat	hep-ph	hep-th	Average
CERN & Member States	35.5%	42.3%	41.6%	38.8%	40.0%
United States	40.2%	30.0%	22.8%	22.3%	24.1%
Other Countries	24.3%	27.7%	35.6%	38.9%	35.9%

Table 3: Distribution of HEP scientific production over three geographical groups for the four HEP `arXiv` classes and their average.

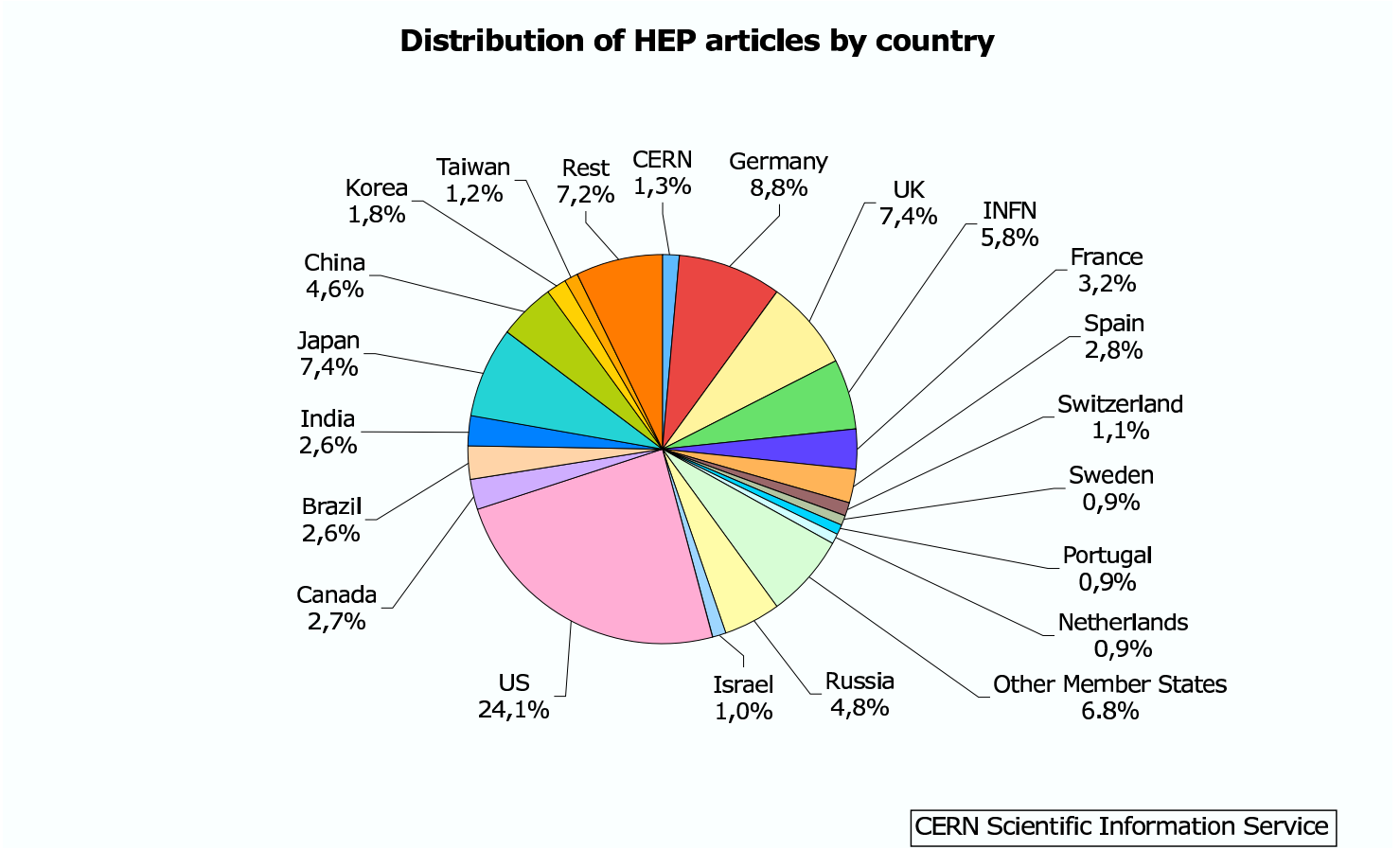

Figure 4: Distribution of the HEP scientific literature over different countries and institutions. A sample of 5016 articles submitted to `arXiv` in 2005 and subsequently published in peer-reviewed journals is considered. Coauthorship is taken into account by assigning fractions of articles to different countries on a *pro-rata* basis.

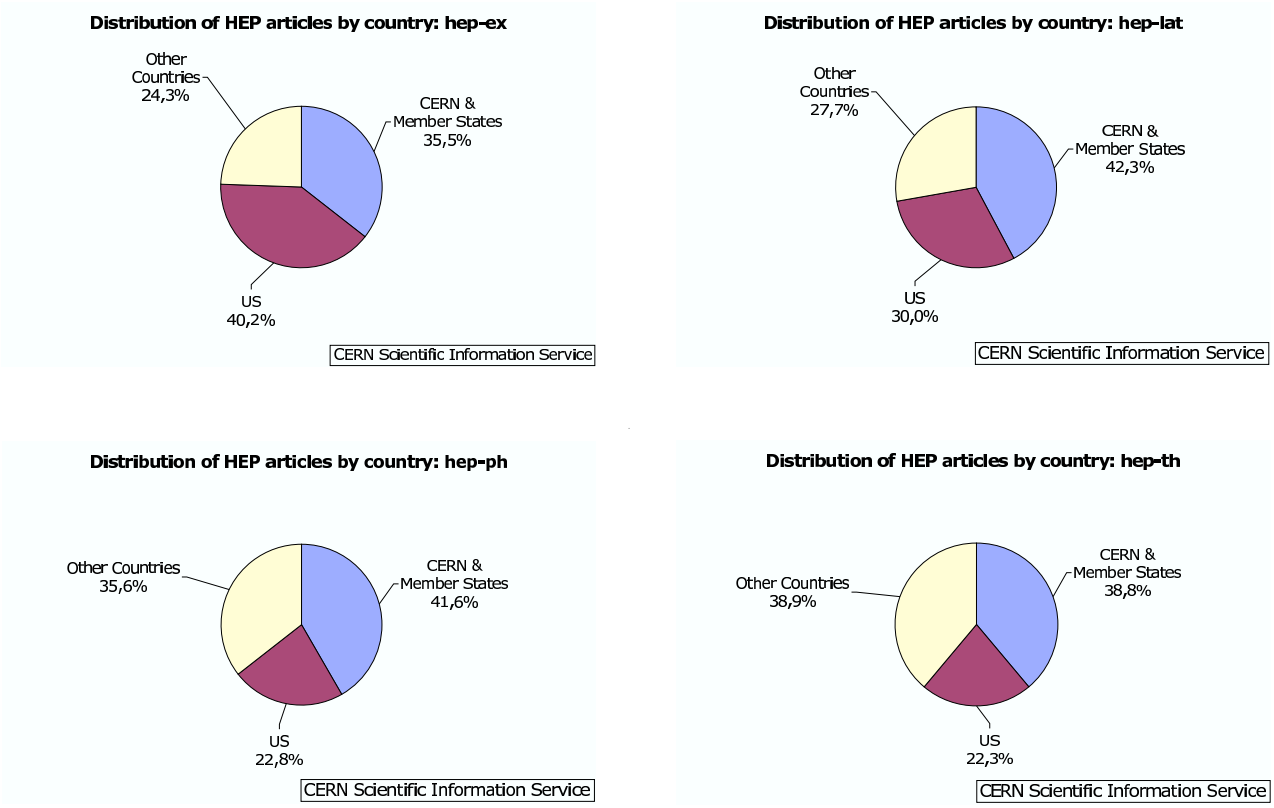

Figure 5: Distribution of HEP scientific production over three geographical groups for the four `arXiv` classes.

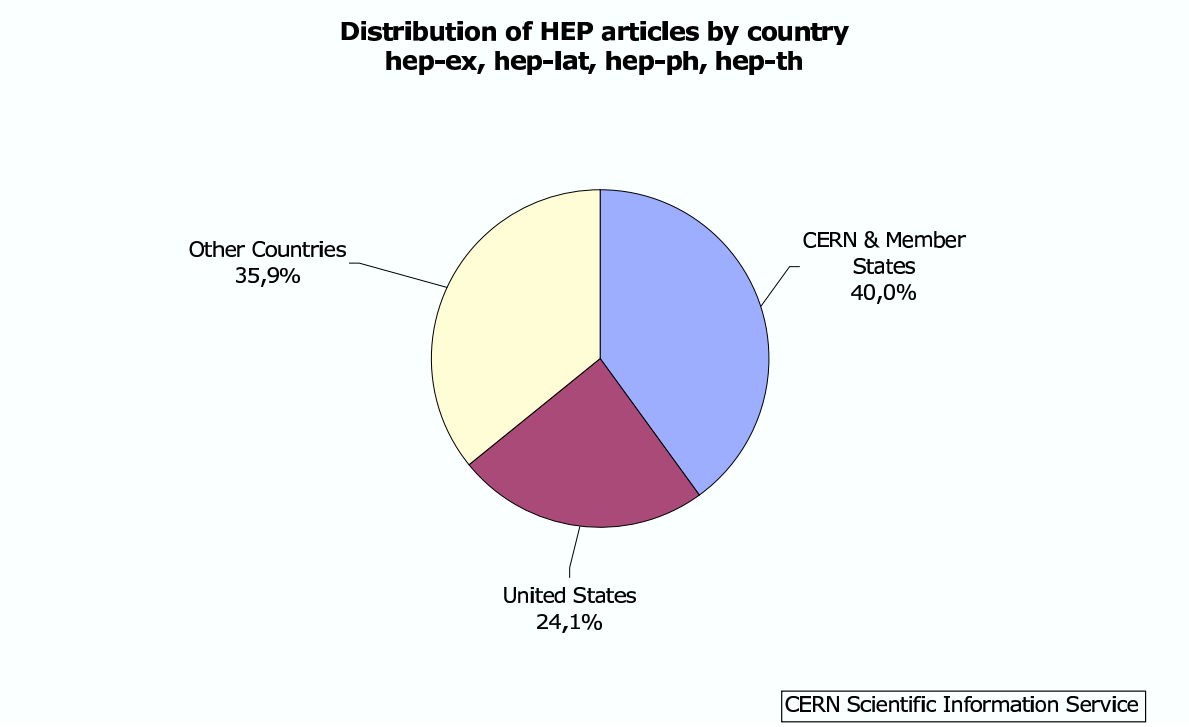

Figure 6: Distribution of HEP scientific production over three geographical groups.

5 Collaborative Patterns in HEP

The data sample under investigation allows a study of the collaborative patterns in HEP in order to answer a natural question: which groups of countries and institutions collaborate? A simplified approach to address this question is chosen, in which only three large groups of authors are considered, according to their affiliation to one of three sections of HEP authorship: CERN and its Member States, the United States, and the remaining countries. Results from more complex analyses of other data samples focusing on author-to-author collaborative networks are presented in Reference [7]. Each article is assigned to one of seven mutually-exclusive classes:

1. all the authors are associated to CERN or any of its Member States;
2. all the authors are associated to the United States;
3. no authors are associated to CERN, its Member States or the United States;
4. some authors are associated to CERN or one of its Member States and some to the United States, but none to any other country;
5. some authors are associated to CERN or one of its Member States and some to other countries, but none to the United States;
6. some authors are associated to the United States and some to other countries but none to CERN or any of its Member States;
7. at least one author is associated to CERN or one of its Member States, one to the United States and one to some other country.

Figure 7 presents the fraction of HEP articles in each of these seven classes while Figure 8 shows the results for the four separate `arXiv` disciplines.

6 Distribution of HEP Publications among Journals

The 5016 articles considered in this study appeared in 89 different peer-reviewed journals. The distribution of articles over the different journals is presented in Table 4 for the four different HEP disciplines and their global average, which is also shown in Figure 9. Only the 11 journals with a share above 1% are considered in Table 4 and Figure 9. However, the share of Nuclear Instruments and Methods in Physics Research (NIM) is also singled out. The contribution to this journal is interesting as this title is the reference journal for instrumentation in HEP. The low share of this journal in the total is due to the reduced contribution of experimental HEP to the total production compared to the theoretical and phenomenological studies, as presented in Figure 1. However, the low percentage of instrumentation articles among the total amount of experimental articles, 2.7%, is also due to the far less widespread culture of self-archiving results in `arXiv` in the HEP instrumentation community. A direct inspection of articles published in NIM in 2005 revealed about 30% of articles of potential interest for HEP instrumentation which had not been submitted to `arXiv`, neither before nor after publication.

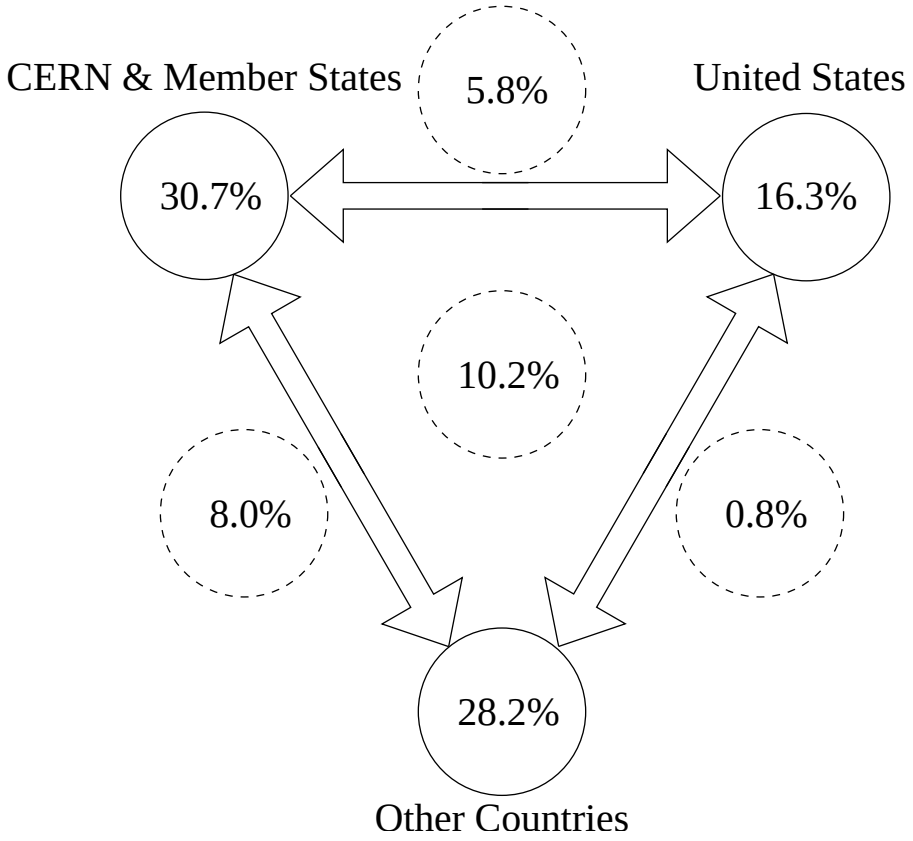

Figure 7: Collaborative patterns in HEP. Numbers in the circles at the vertices of the triangle represent the percentages of articles produced by individual authors or authors collaborating with others within the same group of countries and institutions. Numbers in the dashed circles along the sides of the triangle represent the percentages of articles produced by collaborations of authors from countries and institutions in the two groups indicated by the neighbouring vertices. The number in the dashed circle in the centre of the triangle represents the articles produced by collaborations spanning the three groups of countries. The plot presents results for the entire HEP production submitted to `arXiv` in 2005 and subsequently published.

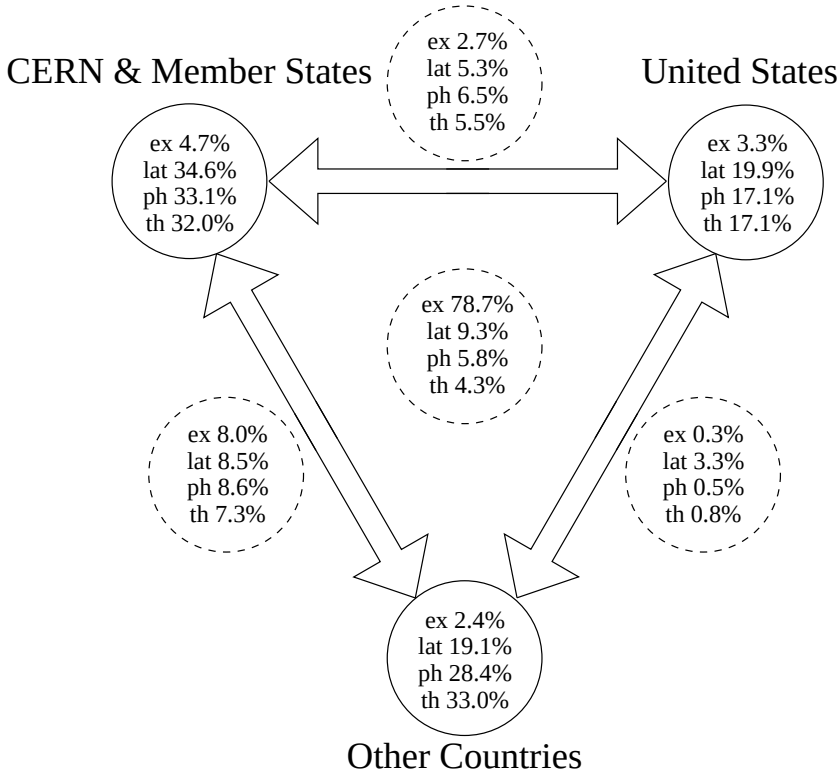

Figure 8: Collaborative patterns in HEP. Collaborative patterns in HEP. Numbers in the circles at the vertices of the triangle represent the percentages of articles produced by individual authors or authors collaborating with others within the same group of countries and institutions. Numbers in the dashed circles along the sides of the triangle represent the percentages of articles produced by collaborations of authors from countries and institutions in the two groups indicated by the neighbouring vertices. The numbers in the dashed circle in the centre of the triangle represents the articles produced by collaborations spanning the three groups of countries. The plot presents the results for each of the four disciplines in which `arXiv` preprints are classified by the authors.

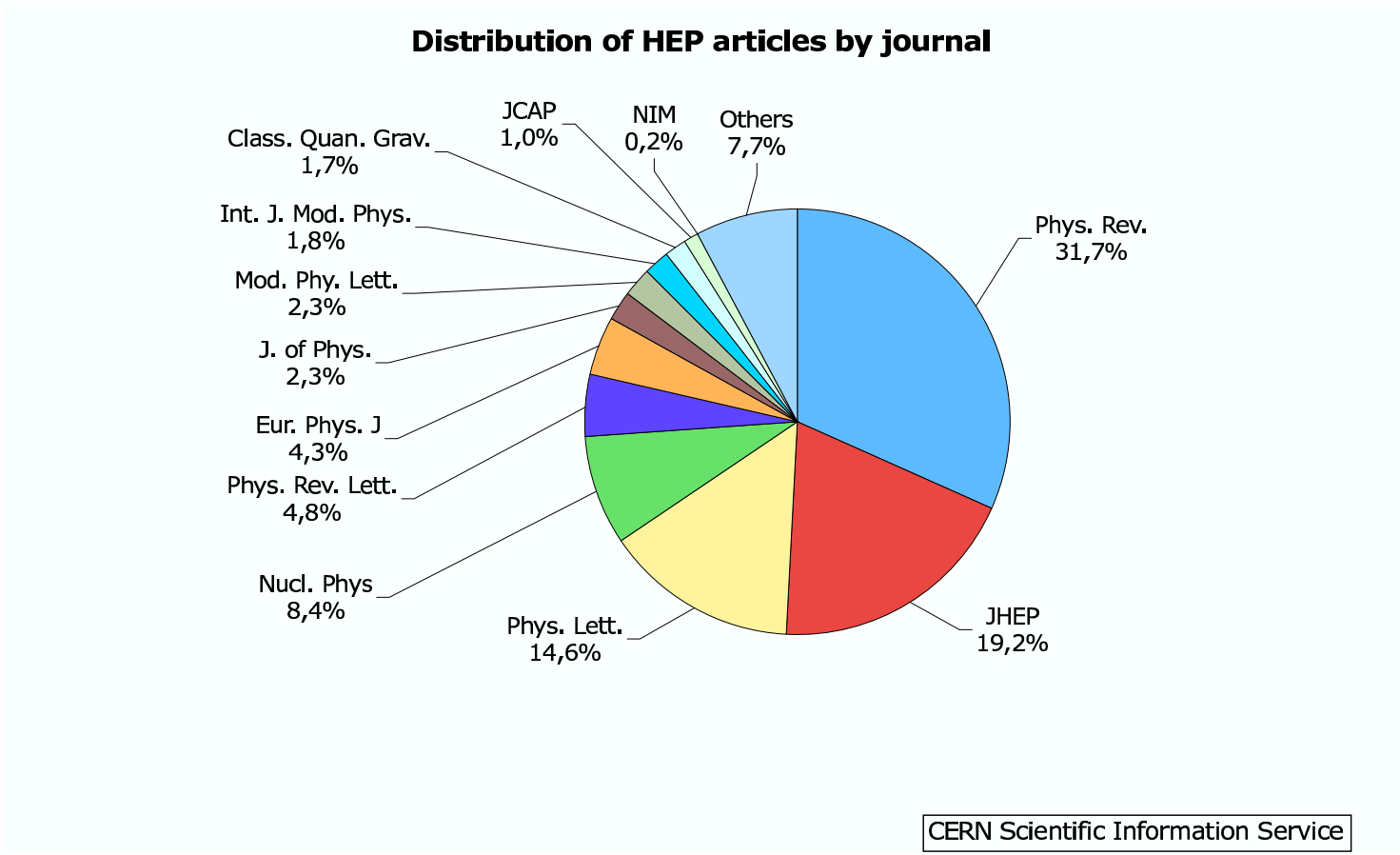

Figure 9: Distribution of the HEP articles in several journals. Only journals with a total share above 1% are considered, with the exception of Nuclear Instruments and Methods in Physics Research (NIM). The remaining 77 journals are grouped under "Others". Journals are ordered clockwise according to decreasing shares. A total of 83% of HEP articles is published in just six journals.

An analysis of the results in Table 4 shows that 83% of HEP articles are published in just six journals: Physical Review (A through E); Journal of High Energy Physics (JHEP); Physics Letters (A and B); Nuclear Physics (A and B); Physical Review Letters and the European Physical Journal (A and C).

Journal	Publisher	hep-ex	hep-lat	hep-ph	hep-th	Average
Phys. Rev.	APS	31.7%	52.8%	41.5%	19.7%	31.7%
JHEP	SISSA	–	14.2%	10.0%	31.8%	19.2%
Phys. Lett.	Elsevier	21.3%	15.9%	16.4%	11.6%	14.6%
Nucl. Phys.	Elsevier	1.2%	6.5%	7.3%	10.7%	8.4%
Phys. Rev. Lett.	APS	29.0%	2.4%	4.4%	1.8%	4.8%
Eur. Phys. J.	Springer	10.7%	2.0%	7.0%	1.0%	4.3%
J. of Phys.	IOP	–	0.8%	2.1%	3.1%	2.3%
Mod. Phys. Lett.	World Scientific	1.2%	0.8%	2.3%	2.6%	2.3%
Int. J. Mod. Phys.	World Scientific	0.3%	1.6%	1.4%	2.3%	1.8%
Class. Quan. Grav.	IOP	–	–	0.1%	3.8%	1.7%
JCAP	SISSA	–	–	1.0%	1.3%	1.0%
NIM	Elsevier	2.7%	–	0.1%	–	0.2%
Others	–	2.1%	2.8%	6.5%	10.2%	7.7%

Table 4: Distribution of HEP articles over different journals for the four HEP `arXiv` classes and their average. Only journals with a total share above 1% are considered, with the exception of Nuclear Instruments and Methods in Physics Research (NIM). The remaining 77 journals are grouped under "Others". The publishers of the different journals are also indicated.

These six journals are published by just four publishers: the American Physical Society, Elsevier, SISSA and Springer, as detailed in Table 4. It is interesting to split the corpus of HEP scientific literature discussed in this article according to the publisher of the journal in which the article appeared. The results are presented in Figure 10. A total of 87% of HEP articles are published by the same four publishers listed above.

7 Geographical Analysis of HEP Journals

The quantitative information on the different countries and institutions contributing to each of the HEP articles considered in this analysis allows the estimation of the geographical distribution of the authors for each of the 12 journals listed in Table 4. The analysis of Section 4 is repeated for each journal and the results are presented in Table 5 for all 22 countries and institutions considered in this article, as well as their grouping into three sections: CERN and its Member States, the United States, and the remaining countries. Figures 11 and 12 present these results in graphical form, with the contributions from CERN and its Member States grouped.

In addition to the geographical distribution of the authors for the major HEP journals, it is interesting to identify the most popular journals of the single countries and institutions considered in this analysis. To extract this information, all articles with at least one author from a given country

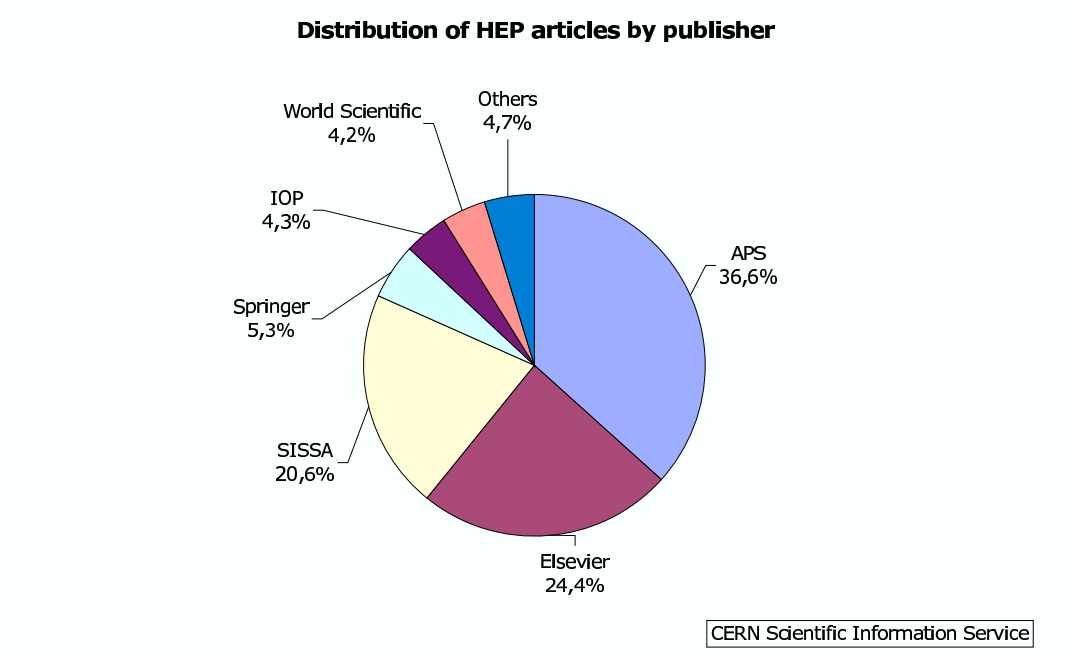

Figure 10: Distribution of HEP articles over different publishers. A total of 87% of HEP articles are published by four publishers: APS, Elsevier, SISSA and Springer.

or institution are first selected. Then, the fraction of authorship of this country or institution is calculated for each article. This fraction is assigned to the journal where the article appeared. The sum of all these fractions for each journal provides a score of the popularity of the journal. If the sum of these scores is used to measure the total HEP scientific production of the country, it can be used to normalise each score and obtain the fractions of the HEP production of the country in the different journals. The results of this study are presented in Table 6 for each of the 22 countries and institutions discussed in this article. The last three lines of Table 6 present the results summed over three groups: CERN and its Member States, the United States and the remaining countries. The results for these groups are presented in Figure 13. Figure 14 and 15 present results for some European countries and institutions and Figure 16 presents results for some of the remaining countries.

8 Conclusions, with a Note on Open Access

This article presents the results of the first bibliometric study of HEP publishing which accounts for the widespread phenomenon of coauthorship. The share of HEP scientific results published by several countries and institutions is correctly calculated and provides interesting insight into the collaborative patterns within the HEP community. The publishing landscape of HEP is further analysed to provide

information on the journals most used by the HEP community and on the geographical distribution of their authors.

It is interesting to put these results into the wider context of a possible transition of HEP publishing to an Open Access model [1]. The finding that 83% of HEP articles are published in just six journals and that 87% of the articles appear in journals published by just four publishers is particularly interesting. It demonstrates that the number of partners to be engaged with in a debate on a change of the HEP publishing model is relatively small. The worldwide collaborative patterns in HEP, which are quantified in this article, suggest that once a limited number of countries embrace an Open Access publishing model, a "domino effect" likely to spread this policy to other countries, through coauthorship links. Last, but not least, the assessment of the relative contribution to the worldwide production of HEP scientific results which takes into account the coauthorship phenomenon, presented in Table 2 and Figure 4, might constitute the basis for a model where each country or institution would contribute with their "fair share" towards the financial cost of Open Access publishing.

Acknowledgments

The idea behind this analysis came up in many discussions with Rüdiger Voss and Gigi Rolandi on the topic of Open Access. We are indebted to Sandrine Reyes and Susanne Schäfer for their help in the compilation of the data set and to our colleagues at SLAC and elsewhere for maintaining and operating SPIRES.

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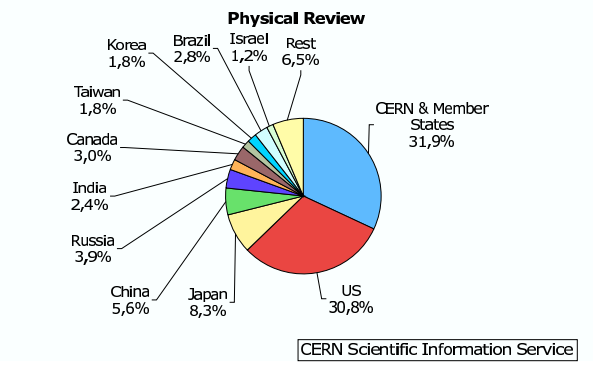
M.A. Rodriguez, *A Multi-Graph to Support the Scholarly Communication* [arxiv:cs.DL/0601121].

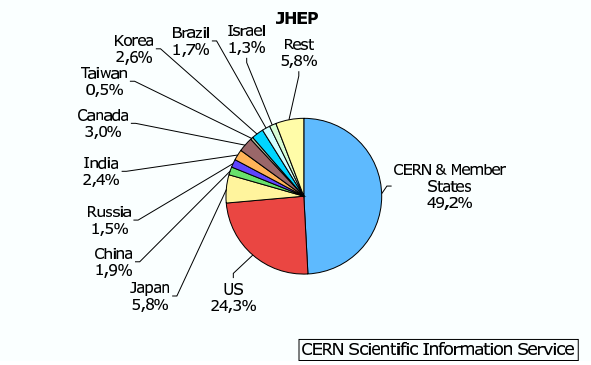
	Phys. Rev.	JHEP	Phys. Lett.	Nucl. Phys.	Phys. Rev. Lett.	Eur. Phys J.	J. of Phys.	Mod. Phys. Lett.	Int. J. Mod. Phys.	Class. Quan. Grav.	JCAP	NIM	Others
CERN	0.7%	2.0%	1.5%	2.5%	0.7%	2.4%	1.3%	0.4%	0.3%	1.4%	2.0%	0.3%	1.1%
Germany	7.2%	9.3%	9.3%	13.5%	9.0%	14.1%	6.1%	4.2%	5.4%	6.5%	7.8%	1.6%	8.5%
UK	6.1%	10.4%	6.5%	7.8%	5.1%	9.8%	10.6%	3.5%	5.1%	16.6%	12.6%	16.0%	4.4%
INFN	4.5%	6.9%	5.8%	10.3%	5.4%	5.4%	4.6%	4.0%	5.3%	4.3%	4.4%	14.6%	5.7%
France	2.5%	2.3%	4.0%	5.3%	2.8%	5.4%	3.4%	1.7%	2.2%	1.0%	4.8%	3.0%	5.0%
Spain	2.6%	4.8%	2.3%	2.2%	2.9%	1.8%	2.3%	0.9%	1.0%	1.8%	5.3%	0.2%	1.8%
Switzerland	0.6%	1.3%	1.9%	1.8%	0.9%	0.5%	2.2%	–	–	–	2.3%	0.2%	0.5%
Sweden	0.6%	1.6%	1.0%	1.2%	0.7%	1.0%	–	0.4%	–	–	4.9%	–	0.6%
Portugal	1.1%	0.5%	1.0%	0.6%	1.2%	0.2%	1.7%	1.2%	–	2.3%	–	–	1.0%
Netherlands	0.4%	2.2%	0.5%	1.1%	0.4%	0.4%	–	–	1.1%	1.6%	2.9%	0.2%	0.7%
Other M.S.	5.6%	7.9%	6.1%	7.6%	4.0%	10.4%	9.6%	3.5%	9.3%	9.0%	9.0%	10.9%	8.1%
Russia	3.9%	1.5%	5.7%	3.9%	2.0%	8.6%	5.7%	7.4%	4.9%	2.3%	0.8%	12.6%	15.2%
Israel	1.2%	1.3%	0.7%	1.4%	0.3%	1.1%	–	1.2%	1.1%	1.5%	0.7%	0.2%	0.1%
United States	30.8%	24.3%	19.2%	21.0%	48.1%	6.9%	10.8%	16.8%	23.0%	24.4%	16.3%	31.7%	10.8%
Canada	3.0%	3.0%	2.0%	3.6%	2.8%	0.7%	3.9%	3.4%	0.3%	7.1%	2.6%	1.4%	1.0%
Brazil	2.8%	1.7%	3.3%	0.2%	0.7%	5.3%	6.4%	5.4%	5.1%	1.1%	1.8%	1.0%	3.0%
Japan	8.3%	5.8%	7.9%	7.2%	4.9%	2.4%	3.1%	4.3%	9.4%	4.2%	11.3%	1.6%	13.6%
China	5.6%	1.9%	5.8%	1.8%	2.2%	10.7%	7.5%	4.6%	3.0%	2.3%	4.1%	–	6.8%
India	2.4%	2.4%	3.6%	1.5%	1.1%	2.8%	5.2%	7.0%	6.3%	2.7%	5.4%	–	1.7%
Taiwan	1.8%	0.5%	1.5%	0.6%	1.4%	1.6%	–	1.7%	–	–	–	–	0.8%
Korea	1.8%	2.6%	2.6%	0.9%	1.3%	0.5%	–	3.6%	–	1.1%	–	0.7%	0.8%
Other Countries	6.5%	5.8%	7.8%	4.1%	2.3%	7.9%	15.7%	24.6%	17.0%	8.6%	1.0%	3.8%	8.9%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
CERN & Member States	31.9%	49.2%	40.1%	53.8%	33.0%	51.5%	41.7%	19.9%	29.7%	44.5%	56.0%	47.0%	37.3%
United States	30.8%	24.3%	19.2%	21.0%	48.1%	6.9%	10.8%	16.8%	23.0%	24.4%	16.3%	31.7%	10.8%
Other Countries	37.3%	26.4%	40.7%	25.2%	18.9%	41.6%	47.5%	63.3%	47.3%	31.0%	27.6%	21.3%	51.9%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

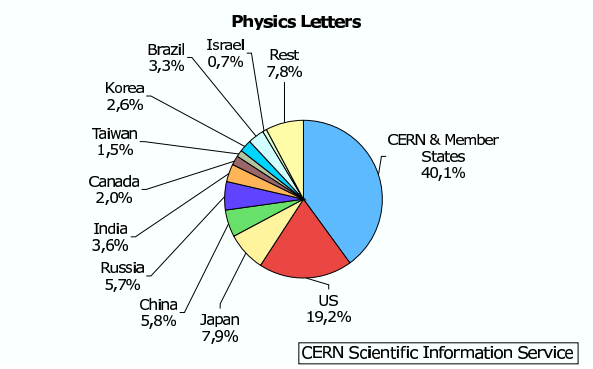
Table 5: Geographical distribution of the authors of HEP journals. The lower part of the table summarises the results for three sections of the HEP community: CERN and its Member States, the United States, and the remaining countries.

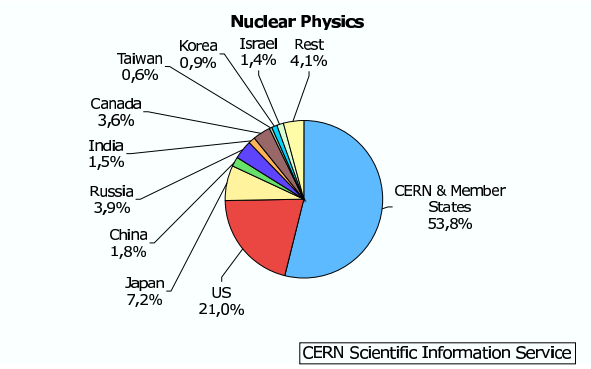
	Phys. Rev.	JHEP	Phys. Lett.	Nucl. Phys.	Phys. Rev. Lett.	Eur. Phys J.	J. of Phys.	Mod. Phys. Lett.	Int. J. Mod. Phys.	Class. Quan. Grav.	JCAP	NIM	Others	Total
CERN	15.5%	29.3%	16.4%	15.6%	2.4%	7.7%	2.2%	0.7%	0.4%	1.9%	1.5%	–	6.3%	100%
Germany	26.1%	20.4%	15.4%	12.8%	4.9%	6.9%	1.6%	1.1%	1.1%	1.3%	0.9%	–	7.5%	100%
UK	26.2%	27.0%	12.8%	8.8%	3.3%	5.7%	3.3%	1.1%	1.2%	3.9%	1.7%	0.5%	4.5%	100%
INFN	24.4%	22.7%	14.6%	14.7%	4.4%	4.0%	1.8%	1.6%	1.6%	1.3%	0.8%	0.5%	7.5%	100%
France	24.7%	13.4%	18.2%	13.5%	4.1%	7.2%	2.4%	1.2%	1.2%	0.5%	1.5%	0.2%	11.8%	100%
Spain	29.1%	33.3%	12.2%	6.5%	5.0%	2.8%	1.9%	0.7%	0.7%	1.1%	1.9%	–	4.8%	100%
Switzerland	18.3%	24.0%	26.4%	14.4%	4.1%	2.1%	4.7%	–	–	–	2.2%	–	3.8%	100%
Sweden	19.8%	33.5%	15.7%	10.9%	3.6%	4.9%	–	1.1%	–	–	5.5%	–	5.0%	100%
Portugal	39.0%	10.7%	16.8%	5.7%	6.5%	1.1%	4.4%	3.1%	–	4.4%	–	–	8.3%	100%
Netherlands	14.8%	47.0%	8.7%	10.6%	2.2%	1.9%	–	–	2.2%	3.1%	3.4%	0.1%	6.0%	100%
Other M.S.	26.2%	22.2%	13.0%	9.3%	2.8%	6.6%	3.2%	1.2%	2.4%	2.3%	1.3%	0.4%	9.1%	100%
Russia	25.8%	6.1%	17.3%	6.8%	2.0%	7.8%	2.8%	3.6%	1.8%	0.8%	0.2%	0.6%	24.4%	100%
Israel	38.5%	25.2%	10.2%	11.4%	1.4%	4.8%	–	2.6%	1.9%	2.6%	0.6%	0.1%	0.7%	100%
United States	40.5%	19.4%	11.6%	7.3%	9.6%	1.2%	1.0%	1.6%	1.7%	1.8%	0.7%	0.3%	3.4%	100%
Canada	35.2%	21.3%	10.9%	11.2%	5.1%	1.1%	3.4%	2.9%	0.2%	4.6%	1.0%	0.1%	3.0%	100%
Brazil	34.4%	12.4%	18.3%	0.7%	1.3%	8.8%	5.7%	4.8%	3.4%	0.8%	0.7%	0.1%	8.8%	100%
Japan	35.6%	15.0%	15.5%	8.1%	3.2%	1.4%	1.0%	1.3%	2.2%	1.0%	1.6%	–	14.1%	100%
China	38.4%	7.9%	18.1%	3.3%	2.3%	10.0%	3.7%	2.3%	1.1%	0.9%	0.9%	–	11.2%	100%
India	28.3%	17.2%	19.8%	4.6%	1.9%	4.6%	4.5%	6.0%	4.2%	1.8%	2.1%	–	4.9%	100%
Taiwan	48.0%	8.8%	18.3%	4.6%	5.6%	6.1%	–	3.4%	–	–	–	–	5.1%	100%
Korea	32.7%	27.8%	21.0%	4.4%	3.6%	1.2%	–	4.7%	–	1.1%	–	0.1%	3.5%	100%
Other Countries	28.7%	15.5%	15.9%	4.7%	1.5%	4.7%	5.1%	7.9%	4.2%	2.1%	0.1%	0.1%	9.6%	100%
CERN & Member States	25.3%	23.7%	14.6%	11.2%	4.0%	5.6%	2.4%	1.1%	1.3%	1.9%	1.4%	0.3%	7.2%	100%
United States	40.5%	19.4%	11.6%	7.3%	9.6%	1.2%	1.0%	1.6%	1.7%	1.8%	0.7%	0.3%	3.4%	100%
Other Countries	33.0%	14.2%	16.5%	5.9%	2.5%	5.0%	3.1%	4.0%	2.3%	1.5%	0.8%	0.1%	11.1%	100%

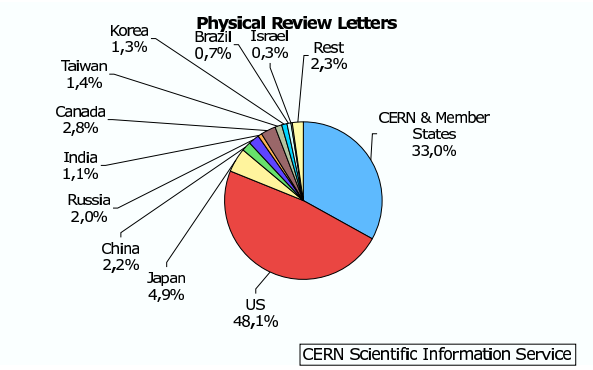
Table 6: Distribution of each country's HEP articles in several journals. The lower part of the table summarises the results for CERN and its Member States, the United States, and all remaining countries.











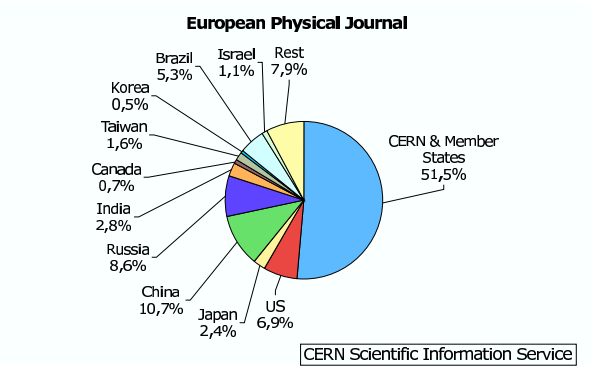
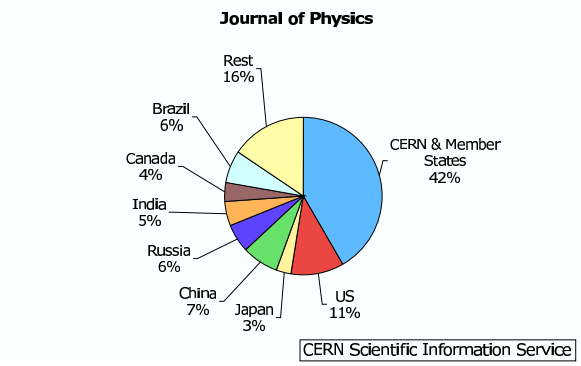
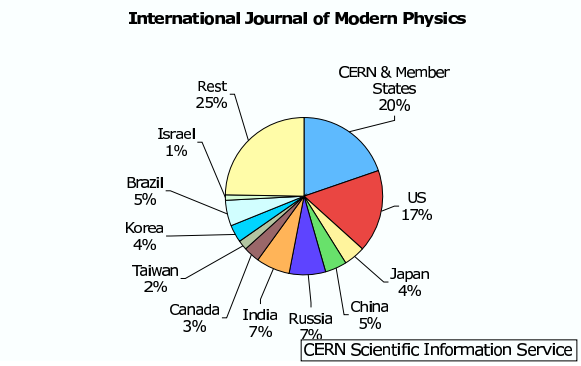
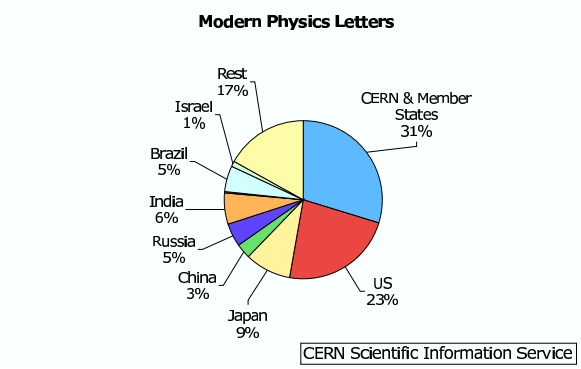
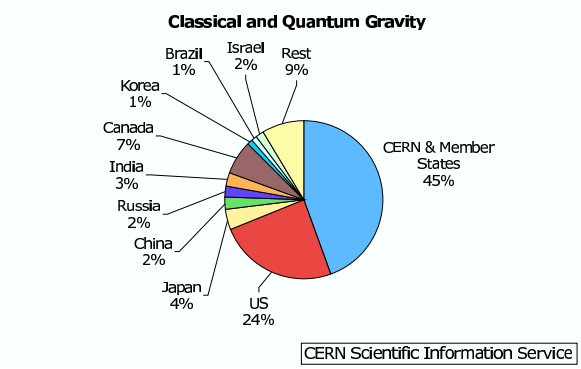


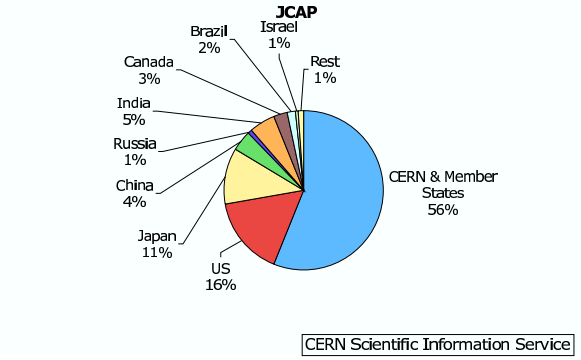
Figure 11: Geographical distribution of HEP authors by journals.











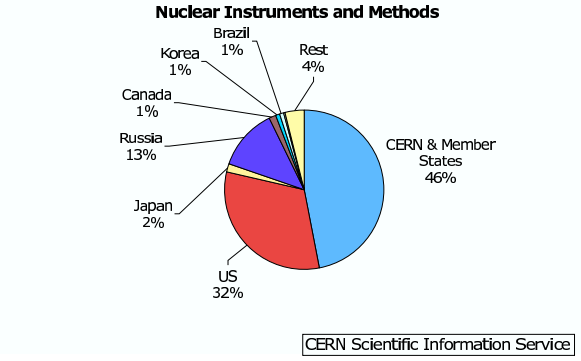
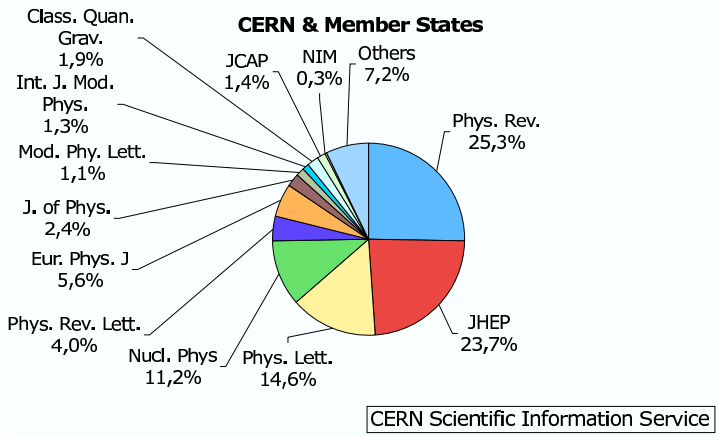
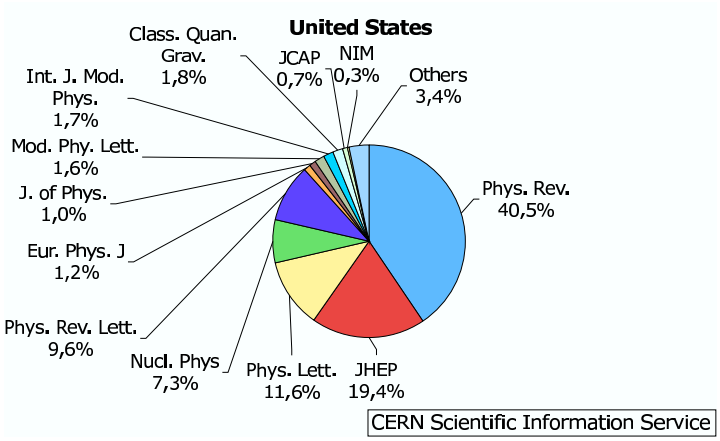


Figure 12: Geographical distribution of HEP authors by journals.





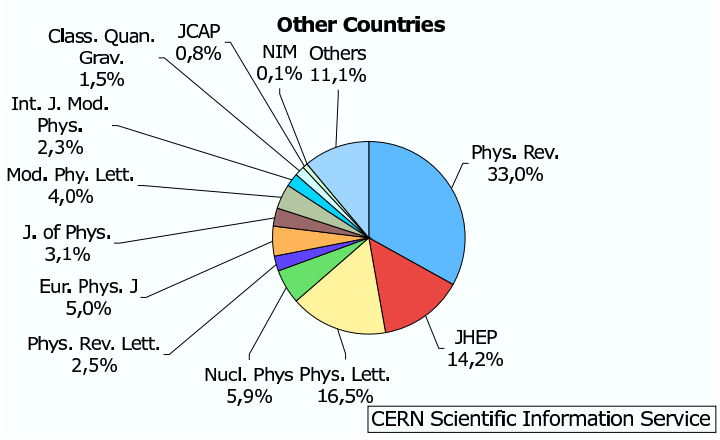
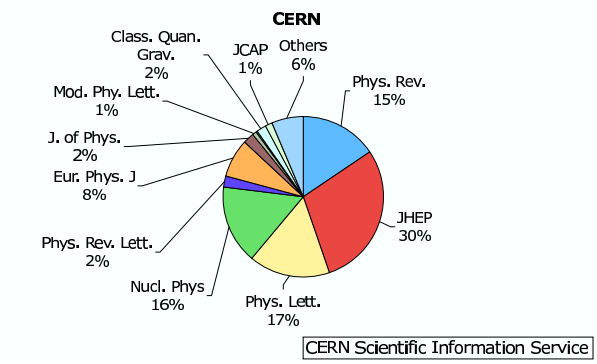
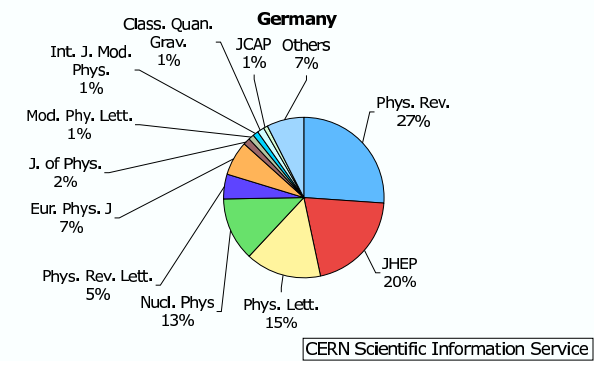
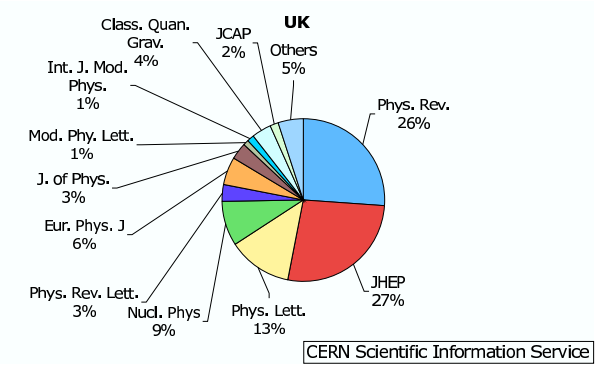
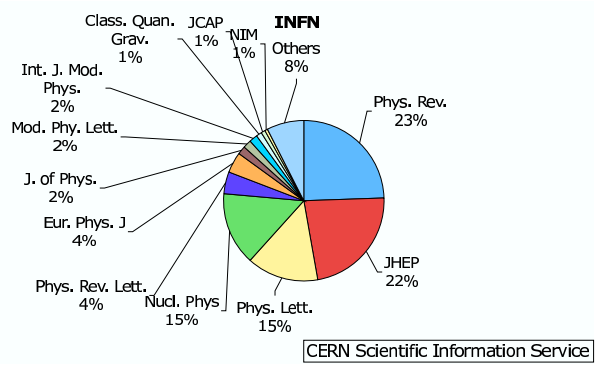


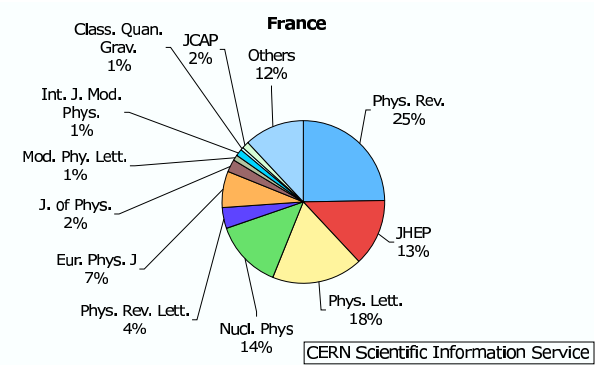
Figure 13: Distribution of HEP articles in different journals for three country groups.











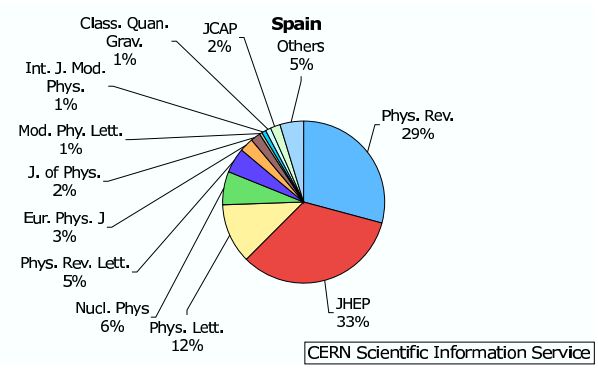


Figure 14: Distribution of HEP articles in different journals for several European countries.

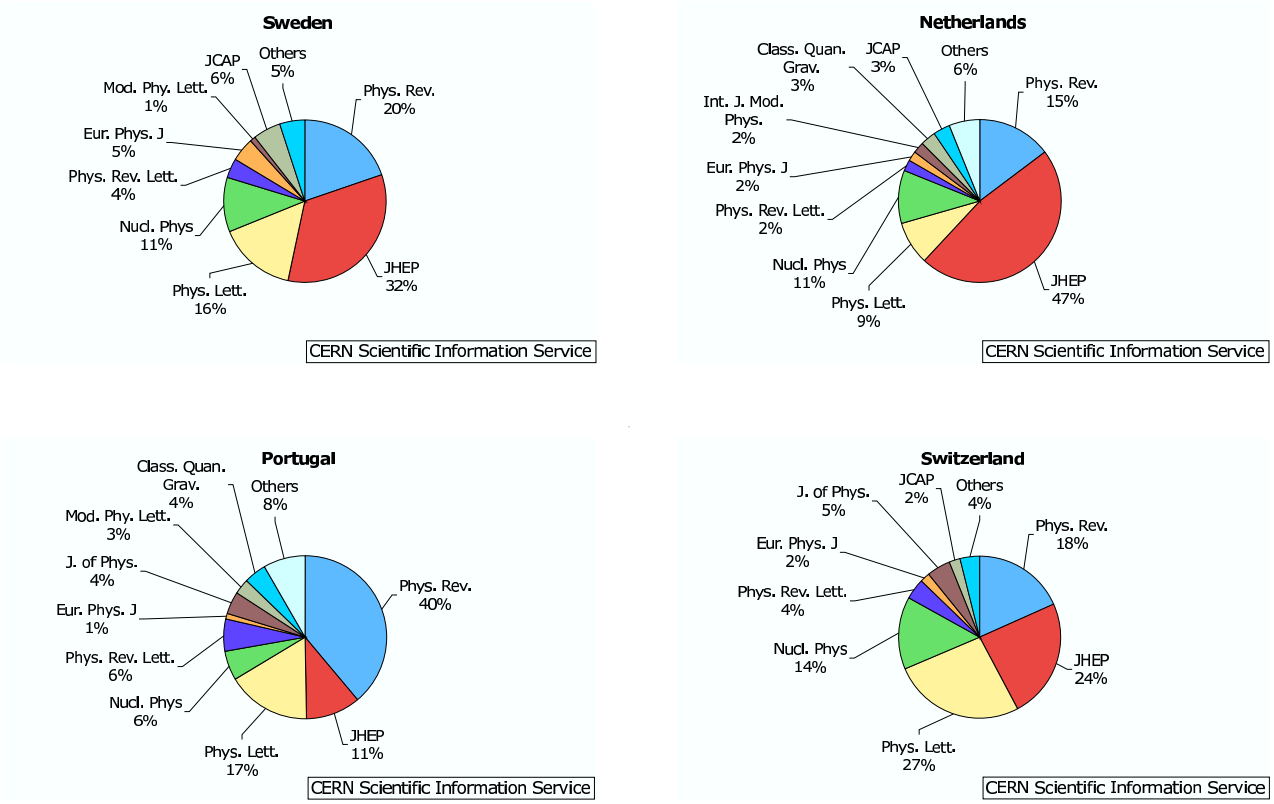
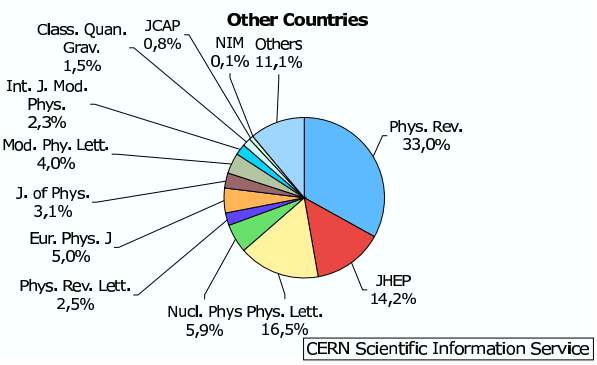
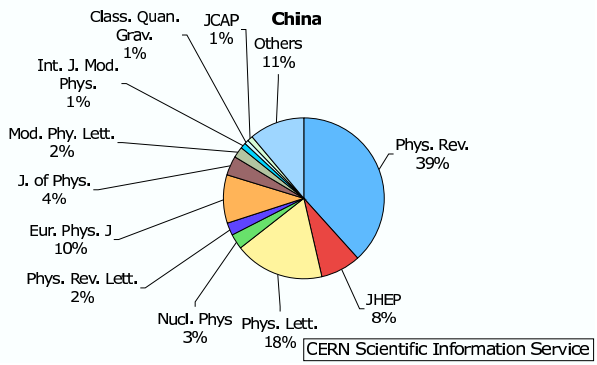
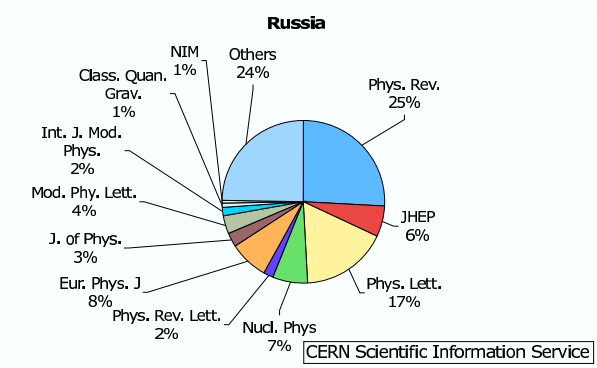
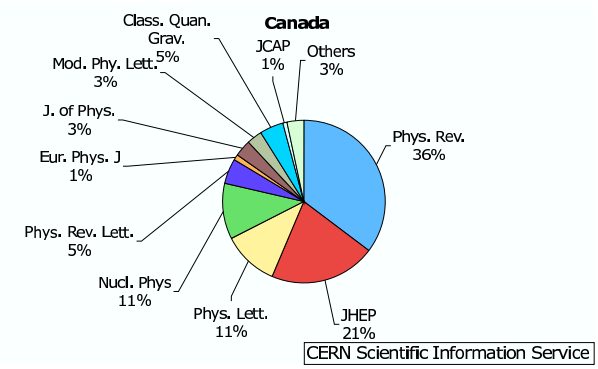


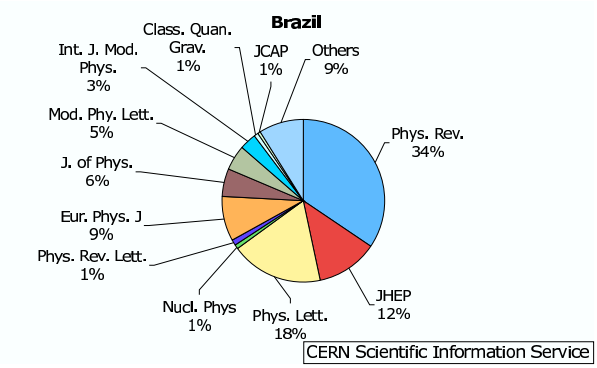
Figure 15: Distribution of HEP articles in different journals for several European countries.











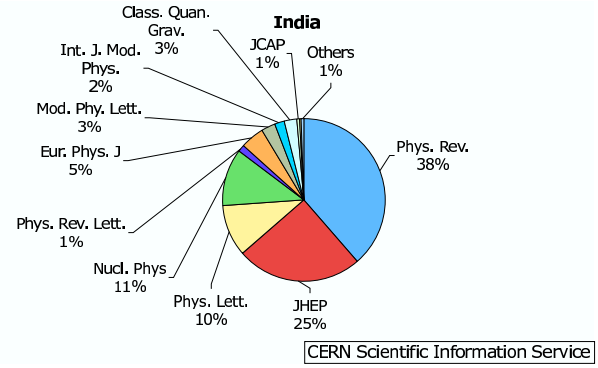


Figure 16: Distribution of HEP articles in different journals for several countries.